

**What is claimed is:**

1. A method of suppressing an echo signal in a communication path comprising the steps of:
  - 5 monitoring a transmitted signal supplied to said communication path to determine an attribute thereof;
  - generating a leaky mask based on said determined attribute and an attribute of a received echo signal; and
  - partially cancelling said received echo signal using said leaky mask.
- 10 2. The method of claim 1 wherein the attribute of said transmitted signal is the power level thereof.
- 15 3. The method of claim 2 wherein the attribute of the received echo signal is the noise level thereof.
4. The method of claim 3 wherein said generating includes the steps of:
  - transmitted signal;
  - 20 generating noise leaking bits based on the noise level of said received echo signal; and
  - combining said suppression mask and noise leaking bits to yield said leaky mask.
- 25 5. The method of claim 4 wherein said during said generating an envelope of the power level of said transmitted signal is generated, said envelope being used to select said suppression mask.
- 30 6. The method of claim 5 wherein said envelope is generated by an infinite impulse response (IIR) lowpass filter.

7. The method of claim 6 wherein said IIR lowpass filter generates said envelope by solving the equation:

$$\text{AbsY} = (1-\alpha) \text{AbsY} + \alpha * \text{AbsY}_0$$

where alpha is a parameter of said IIR filter.

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8. The method of claim 1 further comprising the step of inhibiting said partial cancelling in the presence of double-talk.

9. The method of claim 8 wherein double-talk is declared when the power level of said received echo signal exceeds a threshold value.

10. The method of claim 2 wherein during said generating, an estimated echo signal is also generated based on the power level of said transmitted signal and wherein the partially cancelling step is performed after the estimated echo signal is subtracted from the received echo signal.

11. The method of claim 10 wherein said estimated echo signal is generated using a linear algorithm approximating the transfer function of said communication path.

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12. The method of claim 10 further comprising the step of inhibiting said partial cancelling in the presence of double-talk.

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13. The method of claim 12 wherein double-talk is declared when the power level of said received echo signal exceeds a threshold value.

14. An echo suppressor to suppress an echo signal in a communication path comprising:

a power level calculator determining the power level of a transmitted signal supplied to said communication path; and

a mask generator responsive to said power level calculator and generating a leaky mask, said leaky mask being generated as a function of the

determined power level and the noise level of a received echo signal, said leaky mask being applied to the received echo signal thereby to suppress partially said received echo signal.

5    15.         An echo suppressor according to claim 14 wherein said power level calculator generates an envelope following the power level of the transmitted signal.

10    16.         An echo suppressor according to claim 15 wherein said power level calculator includes an infinite impulse response (IIR) lowpass filter to generate said envelope.

17.         An echo suppressor according to claim 15 wherein said IIR lowpass filter generates said envelope by solving the equation:

$$\text{AbsY} = (1-\alpha) \text{AbsY} + \alpha * \text{AbsY}_0$$

15    where alpha is a parameter of said IIR filter.

18.         An echo suppressor according to claim 14 further including a double-talk detector to inhibit said mask generator in the presence of double-talk on said communication path.

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19.         An echo suppressor according to claim 18 wherein said double-talk detector inhibits said mask generator when the power level of said received echo signal exceeds a threshold value.

25    20.         An echo suppressor to suppress an echo signal in a communication path comprising:

30    a digital signal processor for determining the power level of a transmitted signal supplied to said communication path and for determining the noise level of a received echo signal, said digital signal processor generating a leaky mask based on the determined power level and the determined noise level; and

35    a multiplier for combining said leaky mask and said received echo signal thereby to suppress partially said received echo signal.

21. An echo suppressor according to claim 20 wherein said digital signal processor conditions said leaky mask to a full pass state in the presence of double-talk on said communication path.

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22. An echo suppressor according to claim 21 wherein said digital signal processor conditions said leaky mask to said full pass state when the power level of the received echo signal exceeds a threshold value.

10 23. In a telephone device including a handset having a speaker to broadcast incoming signals and a microphone to receive outgoing signals, an echo suppressor to suppress echo signals picked up by the microphone as a result of acoustic coupling between said speaker and microphone comprising:

15           a power level calculator determining the power level of transmitted signals supplied to said communication path; and

              a mask generator responsive to said power level calculator and generating leaky masks, said leaky masks being generated as a function of the determined power level and the noise level of received echo signals, said leaky masks being applied to the received echo signals thereby to suppress partially said received 20 echo signals.

24. An echo suppressor according to claim 23 further including a double-talk detector to inhibit said mask generator in the presence of double-talk on said communication path.

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25. An echo suppressor according to claim 24 wherein said double-talk detector inhibits said mask generator when the power level of received echo signals exceed a threshold value.

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26. An echo suppressor to suppress echo signals generated in a communication path comprising:

- an echo canceller in parallel with said communication path, said echo canceller having a transfer function approximating that of said communication path and generating estimated echo signals in response to transmitted signals supplied to said communication path, said echo canceller subtracting said estimated echo signals from echo signals received from said communication path to generate residual echo error signals; and
- a processor receiving said estimated echo signals and said residual echo error signals, said processor determining the power level of the transmitted signals supplied to said communication path and generating leaky masks, said leaky masks being generated as a function of the determined power level of said transmitted signals and the noise level of received echo signals, said leaky masks being applied to the residual echo error signals thereby to suppress partially said residual echo error signals.
- 15 27. An echo suppressor according to claim 26 further including a double-talk detector to inhibit said mask generator in the presence of double-talk on said communication path.
- 20 28. An echo suppressor according to claim 27 wherein said double-talk detector inhibits said mask generator when the power level of received echo signals exceed a threshold value.